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The Effectiveness of ISO 9001 Implementation in Food Manufacturing Companies: A Proposed Measurement Instrument

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Abstract

ISO 9001 is a Quality Management System (QMS) standard that is widely adopted by many manufacturing companies, including food manufacturing companies. However, the effectiveness of ISO 9001 implementation is still questioned. Given this, this paper aims to propose an instrument that can be used to measure the effectiveness of ISO 9001 implementation in food manufacturing companies. The paper is important because there is lack of research on the development of measurement instrument of ISO 9001 implementation effectiveness. Furthermore, this paper is important because the knowledge on measurement instrument of ISO 9001 implementation effectiveness is needed by ISO 9001 certified food manufacturing company managers for measuring and improving their QMS.

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INTRODUCTION

The important role of quality management system implementation has been recognized by food manufacturing companies [1, 2]. This is due to the high awareness of customers on the importance of food product quality and safety [1]. The food companies that produce safe and good quality product will survive and even win the competition [1].

Food manufacturing companies have been familiar with the various standards relating to quality assurance

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efforts, such as BRC, HACCP, and ISO 9001 [1, 2, 3]. ISO 9001 is an international standard that is widely adopted by food manufacturing companies. According to the survey conducted by ISO, in 2011, there were 28, 434 companies engaged in the field of food, beverage, and tobacco products are ISO 9001 certified [4]

ISO 9001 is an international standard of quality management system [5]. The standard describes the requirements of a quality management system that needs to be implemented consistently so that the companies can produce the products according to customers' requirements, achieve customer satisfaction, and achieve continual improvement on the effectiveness of their quality management system [5, 6, 7]. Furthermore, ISO 9001 requirements represent quality management system best practices [6]. Thus, food manufacturing companies that implement ISO 9001 are expected to obtain significant outcomes [7, 8, 9]. Given this, it is interesting to study ISO 9001 in the context of food manufacturing companies.

In the context of ISO 9001 implementation in food manufacturing industry, the effectiveness of ISO 9001 implementation still becomes a fundamental issue [7, 10]. This is because there is no measurement instrument of ISO 9001 implementation effectiveness in food manufacturing companies that is widely accepted [7, 10]. In fact, researchers who propose the measurement instrument of the effectiveness of ISO 9001 implementation in food manufacturing companies are still very limited [7]. Thus, in order to fill the literature gap, this paper tries to propose an instrument that can be used to measure the effectiveness of ISO 9001 implementation in food manufacturing companies.

This paper is expected to give some contributions. First, this paper is expected to provide the knowledge needed by researchers who intent to examine the impact of ISO 9001 implementation empirically. To date, the researchers used different measures in assessing the impact of the ISO 9001 implementation [11]. The proposed measurement instrument of ISO 9001 implementation effectiveness of this paper is expected to be the first step to equalize the view related appropriate parameters in measuring the impact of ISO 9001 implementation. Furthermore, the similar measures of the impact of ISO 9001 implementation will make the generalization of the results of the research on the impact of ISO 9001 implementation to be better.

Second, this paper provides the knowledge needed by food manufacturing companies' managers for measuring the effectiveness of ISO 9001 implementation. To date, the contribution of ISO 9001 implementation to the companies' success is still not clear [7]. Hence, the managers can evaluate the usefulness of ISO 9001 implementation for their companies by using the proposed measurement instrument of ISO 9001 implementation effectiveness. This will become an input for deciding improvement action plan regarding ISO 9001 implementation.

Third, this paper is also expected to provide knowledge needed by the managers in developing quality objectives. ISO 9001 requires the companies to develop quality objective for monitoring the performance of their quality management system [5]. The proposed measurement instrument of ISO 9001 implementation effectiveness can become the part of the companies' quality objectives that should be achieved and monitored.

LITERATURE REVIEW

Understanding ISO 9001

ISO 9001 is an international standard of quality management system that issued by ISO [5]. This standard is ISO's standard that most adopted by organizations around the world [12]. The standard was first published in 1987 and then revised in 1994, 2000, and 2008 [13].

ISO 9001 consists of quality management system best practices that are expected to provide significant outcome if the standard is implemented consistently [5, 6, 7]. In the standard, it is mentioned that ISO 9001 aims to ensure organizations to produce the products according to customers' requirements, achieve customer satisfaction, and achieve continual improvement on the effectiveness of their quality management system [5].

Since the 2000 version of the standard, ISO 9001 integrated the Total Quality Management principles into the standard and more focuses on the process and performance rather than documentation [13, 14]. In addition, ISO 9001 also adopted the methodology of PDCA (Plan Do Check Act) [5]. More specifically, ISO 9001 is based on eight quality management principles, namely customer focus, involvement of people, process approach, system approach to management, continual improvement, factual approach to decision making, and mutually beneficial supplier relationship [8, 13].

The eight quality management principles were deployed into five main requirements of ISO 9001 [13]. The first requirement, quality management system, relates to the obligation of organization to manage quality management system processes and documentations [5]. The second requirement, management responsibility, refers to the responsibilities of top management on quality management system [5]. The third requirement, resource management, requires organization to manage resource needed by quality management system [5]. The fourth requirement, product realization, relates to the obligation of the organization's core process [5]. The fifth requirement, measurement, analysis, and improvement, refers to the obligation of organization to measure, analyze, and improve quality management system [5].

ISO 9001 in Food Sector

ISO 9001 is a generic standard [5]. Therefore, the standard can be implemented in every sector, including food sector [9]. Furthermore, ISO has issued ISO 15161 as guidance for implementing the requirements of ISO 9001 in food sector [7].

Although ISO 9001 is a topic widely discussed in quality management literature [11], there are lack of researchers have tried to study ISO 9001 implementation in food sector [9]. Foutopolos et al. [9] studied the implementation of ISO 9001 in the Greek food sector. They found that the major reason for ISO 9001 certification relates to the internal business environment. It is also found that the benefits of ISO 9001 certification is positively influenced by the companies' reason in implementing ISO 9001 and negatively influenced by the difficulties to meet the standard's requirements.

Psomas et al. [7] developed an instrument that measures the effectiveness of the ISO 9001 Quality

Management System (QMS), based on its components, meaning the ISO 9001 objectives; and validated the instrument in the food manufacturing sector. They found that the effectiveness of ISO 9001 implementation in food manufacturing sector can be measured using three dimensions, namely continuous improvement, prevention of nonconformities and customer satisfaction focus.

Psomas and Fotopoulos [3] studied 92 Greek food companies that were ISO 9001 certified. They identified three latent factors/constructs regarding the results of their quality management practices implementation. The results include market benefits, customer satisfaction, and quality improvement.

Measurement of ISO 9001 Implementation Effectiveness

According to ISO 9000 [15], effectiveness is defined as “the extent to which the anticipated results/objectives are achieved”. Hence, the effectiveness of ISO implementation can be defined as the extent to which the anticipated results/objectives of ISO 9001 are achieved [7].

In ISO 9001, the measurement activities are explicitly mentioned in the clause of 8.2 (monitoring and measurement) [5]. The clause requires organization to perform some measurements, namely customer perception measurement, system overall performance measurement, process and product measurement [5]. Hence, the measurement instrument of ISO 9001 implementation effectiveness should consider those measurement components.

Research on the measurement of the effectiveness of ISO 9001 implementation is still very limited [7]. However, some researchers have tried to propose measurement instrument of ISO 9001 implementation effectiveness. Table 1 shows the measurement proposed by those researchers.

Based on table 1, it can be seen that researchers discussing the measurement instrument of ISO 9001 implementation effectiveness in food manufacturing companies is very limited. Furthermore, there is no the existing measurement instrument of ISO 9001 implementation effectiveness in food manufacturing companies that considers eight quality management principles, as the driver of quality management system, and the component proposed by the standard to be measured (clause 8.2 of ISO 9001). Thus, it is important to develop another measurement instrument of ISO 9001 implementation effectiveness in food manufacturing companies.

MATERIALS AND METHOD

In order to develop the measurement instrument of ISO 9001 implementation effectiveness in food manufacturing companies, desk study was performed. The data sources of this desk study are ISO 9001 standard and its standard family [5, 15, 19], supporting documents that provided by ISO for implementing the standard [20, 21, 22, 23, 24], ISO 9001 literature and previous researches on the measurement instrument of ISO implementation effectiveness. The analysis was performed by two stages. First, we selected the dimensions of the measurement instrument of ISO 9001 implementation effectiveness in food manufacturing companies. Related to this matter, the criteria we used to select the dimension are the dimension should include lagging dimension and leading dimension.

The existence of both lagging and leading dimensions make a performance measurement system becomes balance [25]. Given this, the dimension of the measurement of ISO 9001 implementation effectiveness should represent the eight quality management principles and the system components that should be monitored according to the ISO 9001 clause of 8.2. The eight quality management principles are the base of ISO 9001 requirements. Therefore, the principles can be viewed as the driver of effective ISO 9001 implementation. Furthermore, the dimensions representing the eight quality management principles can be seen as leading dimensions. Meanwhile, the dimension representing the system components that have to be monitored according to the ISO 9001 clause of 8.2 can be positioned as lagging dimensions which become the bottom line of ISO 9001 implementation.

Table 1. The Existing Measurement Instrument of ISO 9001 Implementation Effectiveness

Author (s)	Object	Dimensions
Psomas et al. [7]	Food Manufacturing Sector	Continuous improvement, prevention of nonconformities and customer satisfaction focus.
van der Spiegel et al. [1]	Agri-food Production	quality management, quality performance and contextual factors (i.e. the complexity of the organization, the production process, and product assortment)
Lewis et al. [8]	SME	customer focus, involvement of people, process approach, system approach to management, continual improvement, factual approach to decision making, and mutually beneficial supplier relationship
To et al. [16]	Public Sector	customer focus, involvement of people, process approach, system approach to management, factual approach to decision making, and mutually beneficial supplier relationship
Prajogo [17]	Manufacturing and non-manufacturing sector	Implementation process
Singh [18]	Manufacturing sector	Management policies, plans and actions; focus on customers; capable employees; reliable suppliers; sound communication system; and steady processes.

Second, based on the dimensions identified in the first stage, we identified the indicators of each dimensions. Given this, review on quality management literature that discusses the dimensions was performed. The identified indicators were then analyzed to determine the relevancy of the indicators for measuring the effectiveness of ISO 9001 implementation in food manufacturing companies. Thus, we obtained the measurement instrument of ISO 9001 implementation effectiveness in food manufacturing companies that consists of dimensions and indicators.

PROPOSED MEASUREMENT OF ISO 9001 IMPLEMENTATION EFFECTIVENESS IN FOOD MANUFACTURING COMPANIES

Table 2 shows the proposed measurement instrument of ISO 9001 implementation effectiveness in food manufacturing companies. Table 2 shows that the instrument consists of 12 dimensions and 33 indicators. 8

dimensions, which are customer focus, involvement of people, process approach, system approach to management, continual improvement, factual approach to decision making, and mutually beneficial supplier relationship, are leading dimensions. The dimensions represent eight quality management principles which underline ISO 9001 requirements. Meanwhile, 4 dimensions, which are product performance, process performance, system & customer based performance, and financial performance, are lagging dimensions. The dimensions represent the system components that have to be monitored according to the ISO 9001 clause of 8.2.

Table 2. The Proposed Measurement Instrument of ISO 9001 Implementation Effectiveness in Food Sector

Dimension	Indicator	Supporting Literature
Customer Focus	3: The consistent & effective system of customer needs identification and review, The consistent & effective system of customer satisfaction measurement and improvement, The consistent & effective system of customer complaint handling	[5],[7],[8], [10], [13], [16], [17],
Leadership	4: Top management involvement, The Clear and deployed quality policy, The consistent & effective system of quality objective development and review, The management commitment for providing resources	[18], [19], [23]
Involvement of people	5: The clear and accepted job description, the competence of personnel, the consistent & effective system of training, the consistent & effective system of recruitment, employee satisfaction	
Process approach	3: The clear and effective the method for executing process; The consistent and effective process measurement system; The consistent and effective process control system	
System approach to management	2: The clear and effective business process; The consistent and effective internal communication system	
Factual approach to decision making	2: The consistent and effective data based decision making; The consistent and effective data collection	
Mutual beneficial supplier relationship	3: Supplier performance, Supplier satisfaction, The consistent and effective vendor selection and evaluation system	[5],[7],[8], [10], [13],
Continual Improvement	4: The consistent and effective audit internal system, The consistent and effective corrective and preventive system, The consistent and effective management review system, Rate of improvement	[16], [17], [18], [19], [23]
Product Performance	1: Product quality level	
Process Performance	3: Product defect per process, Process cost, Process Cycle time	
System & customer based performance	2: Customer satisfaction, Regulatory compliance	
Financial performance	1: Quality cost	

The proposed measurement instrument of ISO 9001 implementation effectiveness in food manufacturing companies has some strength points compare with other instruments available in current literature. First, the proposed instrument has lagging and leading dimensions. The presents of leading dimension make the companies could identify the specific area of improvement while the existence of lagging dimensions make the companies could identify the contribution of ISO 9001 implementation to the companies' success. To date, the measurement instrument of ISO 9001 implementation effectiveness available in current literature only focuses on lagging

dimensions or leading dimensions. Second, the proposed measurement instrument was developed based on the synthesis of other researchers' ISO 9001 implementation effectiveness measurement instrument. Hence, it is expected that our proposed measurement instrument has adequate content validity. Third, the proposed measurement instrument involves dimension representing eight quality management principles. This is useful for checking whether the method of the companies in implementing ISO 9001 is aligned with the eight quality management principles. Four, the proposed measurement instrument includes representing the system components that have to be monitored according to the ISO 9001 clause of 8.2 explicitly. Therefore, the measurement instrument can be used as base in developing quality objectives and quality plan of the companies.

CONCLUSION AND FUTURE RESEARCH

Conclusion

ISO 9001 is a quality management standard that is widely adopted by food manufacturing companies. However, the effectiveness of ISO 9001 implementation in food manufacturing companies still becomes a fundamental issue. This is because there is no a measurement instrument of ISO 9001 implementation effectiveness that is widely accepted. In fact, lack of researchers who propose the measurement instrument of the effectiveness of ISO 9001 implementation in food manufacturing companies. Therefore, in order to address the gap in the literature, this paper tries to propose an instrument that can be used to measure the effectiveness of ISO 9001 implementation in food manufacturing companies. Based on the analysis we performed, this paper proposed the measurement instrument of the effectiveness of ISO 9001 implementation in food manufacturing companies as shown in table 2. The proposed measurement instrument consists of 12 dimensions and 33 indicators. There are 8 leading dimensions, which are customer focus, involvement of people, process approach, system approach to management, continual improvement, factual approach to decision making, and mutually beneficial supplier relationship, and 4 lagging dimensions, namely product performance, process performance, system & customer based performance, and financial performance.

Future research

This paper has proposed a new instrument for measuring the effectiveness of ISO 9001 implementation in food manufacturing companies. Given the instrument was developed using desk study, we recommend some future researches. First, field survey is needed to verify the construct validity, criterion related validity, reliability, and goodness of fit of the proposed measurement instrument. Second, it is also needed to perform action research of the proposed measurement instrument so that the strength points of the instrument can be verified. In addition, the future research also needed to develop scoring system of the measurement instrument.

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